Power Panel

User's Manual

Version: **1.4 (July 2002)**

Model No.: **MAPP01-E**

We reserve the right to change the contents of this manual without warning. The information contained herein is believed to be accurate as of the date of publication, however, Bernecker + Rainer Industrie-Elektronik Ges.m.b.H. makes no warranty, expressed or implied, with regards to the products or the documentation contained within this book. In addition, Bernecker + Rainer Industrie-Elektronik Ges.m.b.H. shall not be liable in the event of incidental or consequential damages in connection with or arising from the furnishing, performance, or use of these products.

Software names, hardware names, and trademarks used in this document are registered by the

Chapter 1: Power Panel

Chapter 2: Technical Appendix

Index

Chapter 1: Power Panel 7

1. Safety Guidelines 7
1.1 Introduction 7
1.2 Intended Use 7
1.3 Transport and Storage 7
1.4 Installation 8
1.5 Operation 8
1.5.1 Protection against Touching Electrical Parts 8

2. Safety Notices 9

3. Manual History 9

4. General Information 10
4.1 Introduction 10
4.2 Features 10
4.3 Photo 11

5. Power Panel PP21 12
5.1 Order Data 12
5.2 Photo 13
5.3 Technical Data 13
5.4 Images 17
5.5 Dimensions 18

6. Power Panel PP41 19
6.1 Order Data 19
6.2 Photo 20
6.3 Technical Data 20
6.4 Images 24
6.5 Dimensions 25

7. Power Panel Expansion EX101 Module 25
7.1 General Information 25
7.2 Order Data 25
7.3 Photo 26
7.4 Technical Data 27
7.5 Images 27
7.6 Dimensions 28
7.7 Installation 29

8. IF370 CAN Interface Module 30
8.1 General Information 30
8.2 Order Data 30

8.3 Photo 30
8.4 Technical Data 30
8.5 Status LEDs 31
8.6 Pin Assignments 31

9. Mounting Instructions 32

10. Device Label 33

11. Programming 33
11.1 Programming the PLC CPU 33
11.2 Visualization 33

12. Description of Components 34
12.1 Status LEDs 34
12.2 Power Supply 34
12.3 Interfaces 35
12.3.1 CAN Interface 35
12.3.2 RS232 Interface 36
12.4 Operating Mode Switch 36
12.5 Programming System Flash 37
12.6 PCMCIA Slot 37
12.6.1 Limitations when using Memory Cards 38
12.7 Power Panel Interface 38
12.8 Screw-in Module Overview 38
12.9 Data/Realtime Buffering 39
12.10 Digital Inputs 40
12.10.1 Terminal Block Connections 40
12.10.2 Input Circuit Diagram 40
12.10.3 Connection Example 41
12.11 Digital Outputs 41
12.11.1 Terminal Block Connections 41
12.11.2 Output Circuit Diagram 42
12.11.3 Output Circuit Diagram for Potential-Free Relay Contact 42
12.11.4 Connection Example for Outputs 1 - 8 42
12.11.5 Connection Example for Potential-Free Relay Contact 43

13. Changing the Battery 44
13.1 Battery Data 44
13.2 Buffer Duration 44

Chapter 2: Technical Appendix 47

1. Décor Foil (polyester foil) 47

2. Characters for LC Displays (English/Katakana) 48

Chapter 1 • Power Panel

1. Safety Guidelines

1.1 Introduction

Programmable logic controllers (e.g. PLCs, etc.), operating and monitoring devices (e.g. Industrial PCs, Power Panels, Mobile Panels, etc.) as well as the B&R uninterruptible power supplies have been designed, developed and manufactured for conventional use in industry. They were not designed, developed and manufactured for any use involving serious risks or hazards that without the implementation of exceptionally stringent safety precautions could lead to death, injury, serious physical damage or loss of any other kind. Such risks and hazards include in particular the use of these devices in the monitoring of nuclear reactions in nuclear power plants and of flight control systems, in flight safety, in the control of mass transportation systems, in medical life support systems, and in the control of weapons systems.

Both when using programmable logic controllers and when using operating and monitoring devices as control systems in conjunction with a Soft PLC (e.g. B&R Automation Runtime or comparable products) or a Slot PLC (e.g. B&R LS251 or comparable products), the safety precautions applying to industrial control systems (e.g. the provision of safety devices such as emergency stop circuits, etc.) in accordance with applicable national and international regulations must be observed. The same applies for all other devices connected to the system, such as drives.

All tasks such as installation, commissioning and service may only be carried out by qualified personnel. Qualified personnel are persons who are familiar with transport, mounting, installation, commissioning and operation of the product and have the appropriate qualifications (e.g. IEC 60364). National accident prevention guidelines must be followed. The safety guidelines, connection descriptions (rating plate and documentation) and limit values listed in the technical data must be read carefully before installation and commissioning and must be observed.

1.2 Intended Use

Electronic devices are generally not fail-safe. In the event of a failure on the programmable control system, operating or monitoring device or uninterruptible power supply, the user is responsible for ensuring that other devices that may be connected, such as motors, are made safe

1.3 Transport and Storage

During transport and storage, the devices must be protected from excessive stress (mechanical load, temperature, humidity, aggressive atmosphere).

1.4 Installation

- The installation must take place according to the documentation using suitable equipment.
- The devices may only be installed when isolated from the power supply and by qualified personnel.
- General safety regulations and nationally applicable accident prevention guidelines must be observed.
- Electrical installation must be carried out according to the relevant guidelines (e.g. line cross section, fuse, protective ground connection).

1.5 Operation

1.5.1 Protection against Touching Electrical Parts

The operation of programmable logic controlllers, operating and monitoring devices and uninterruptible power supplies necessarily means that certain components must carry dangerous voltage levels of over 42 VDC. A life-threatening electric shock could occur if you touch these parts. This could result in death, severe injury or material damage.

Before turning on programmable control systems, operating and monitoring devices and the uninterruptible power supply, ensure that the housing is properly connected to protective ground (PE rail). The ground connection must be established even when testing the operating and monitoring devices and the uninterruptible power supply or when operating them for only a short time.

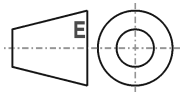
Before turning the device on, make sure that all voltage-carrying parts are securely covered. During operation, all covers must remain closed.

2. Safety Notices

Safety notices are organized as follows:

Safety Notice	Description
	Disregarding the safety regulations and guidelines can result in severe injury or heavy damage to material or the product.
	Disregarding the safety regulations and guidelines can result in injury or damage to material and the product.

Table 1: Safety notices



European dimension standards are valid for all dimension diagrams (e.g. dimension diagrams, etc.).

3. Manual History

Version	Date	Comments
1.4	22.05.2002	Changes/New features - Safety guidelines added - Error correction: Digital inputs for PP21/PP41: Electrical isolation for input - output Yes or digital outputs for PP21/PP41: Electrical isolation for input - output Output - Input Yes - Pin assignment RS232 interface updated - Guidelines for using PCMCIA memory cards regarding Tasks added - Input and output circuit diagrams added - Technical data regarding switching threshold for digital inputs for PP21 and PP41 deleted
1.3	04.12.2001	Changes/New features - Operating system updates using the MEMCARD and mode switch described in more detail
1.2	09.11.2001	Changes/New features - PCMCIA interface description added - 7AT324.70 screw-in module included - "Mode switch" picture replaced - Battery buffer time improved (10 minutes guaranteed) - Correction of description for the inputs and outputs (they are electrically isolated)

Table 2: Manual history

4. General Information

4.1 Introduction

B&R offers the B&R Power Panel PP21 and PP41 for automation of small to midsize machines and systems. The Power Panel is a combination of operator panel and controller in one device.

A 4 x 20 character text display or a ¼ VGA graphic display can be selected. Each Power Panel is equipped with a powerful PLC CPU including integrated digital I/O and six slots for B&R SYSTEM 2003 screw-in modules. An expansion module is offered for the Power Panel PP41 which allows the operation of B&R SYSTEM 2005 interface module inserts.

The visualization application is created using B&R Automation Studio™. Programming the PLC CPU is done using B&R Automation Studio™ or PG2000.

4.2 Features

- 24 VDC supply voltage
- Software compatible with B&R 2000 PLC family
- PCMCIA Slot
- 10 digital inputs
- 8 digital outputs
- 1 potential-free relay contact
- RS232 Interface
- CAN bus interface
- 6 slots for B&R SYSTEM 2003 screw-in modules, 3 of which support additional functions (TPU) such as event counting, trigger functions, stepper motor control, frequency measurement or communication modules
- Expansion module for the Power Panel PP41 which allows the operation of B&R SYSTEM 2005 interface module inserts

4.3 Photo

Figure 1: Power Panel

5. Power Panel PP21

5.1 Order Data

Model Number	Short Description
	Power Panel
4P0420.00-490 [1)]	Power Panel PP21, LC display 4x20 characters, background lighting, 34 function keys, system compatible 2003 CPU, 700Kb SRAM, 1.4MB FlashPROM, 1 PCMCIA slot, 1 RS232 interface, 1 CAN interface: electrically isolated, network capable, 6 slots for screw-in modules, 10 digital inputs 24 VDC, 8 digital outputs 24 VDC, 0.4 A, IP65 protection (from front), 155 x 190 mm (WxH), 24 VDC, Order TB712 terminal blocks separately!
	Accessories
0AC201.9	Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell
0MC111.9	PCMCIA memory card, 2MB FlashPROM
0MC211.9	PCMCIA memory card, 2MB SRAM
4A0035.00-000	Set of legend strips for 4P0420.00-490 (for 10 devices)
7TB712.9	Terminal block, 12 pin, screw clamps
7TB712.91	Terminal block, 12 pin, cage clamps
7TB712:90-02	Terminal block, 12 pin, 20 pcs., screw clamps
7TB712:91-02	Terminal block, 12 pin, 20 pcs., cage clamps

Table 3: Order data for the Power Panel PP21

1) All parts required to install the Power Panel, including key legend sheets, are included in its delivery. The backup battery and the 4 pin terminal block for the supply are also included. Two 12 pin terminal blocks must be ordered separately.

5.2 Photo

Figure 2: Power Panel PP21

5.3 Technical Data

Product ID	PP21
General Information	
C-UL-US Listed	In preparation
Standards Temperature Shock / Tests Carried Out Vibration / Tests Carried Out Emission / Tests Carried Out Immunity / Tests Carried Out	 IEC61131-2 / IEC60068-2-x IEC61131-2 / IEC60068-2-27 IEC61131-2 / IEC60068-2-6 EN50081-2 / EN55022+A1 IEC61131-2 / IEC61000-4-x
Processor	
Additional I/O Processor	Handles I/O data points
Instruction Cycle Time (Average value with 70% bit and 30% analog processing)	0.4 µs
Standard Memory User RAM System PROM User PROM	 700 Kbyte SRAM 600 KByte FlashPROM 1.4 MByte FlashPROM

Table 4: Technical data for PP21

Product ID	PP21
Data Buffering Backup Battery Buffer Current Typical Maximum	 Lithium battery 3 V / 950 mAh 10 µA 200 µA
Hardware Watchdog	Yes
Voltage Monitoring	The internal supply is monitored for overvoltage and undervoltage
Fan	No
Peripherals	
Real-Time Clock Resolution	Nonvolatile 1 sec
Status Display	LEDs
System Bus for Expansions	No
Slots for B&R 2003 Screw-in Modules Suitable for IF Modules (without CAN) TPU Functionality Support Suitable for CAN Communication	6 Slots 1-3 Slots 4-6 Slot 1 with interface module 4IF370.7
PCMCIA slot (See "PCMCIA Slot" on page 37.) Standard Card Height Card Type Memory Size SRAM FlashPROM	1 JEIDA V 4.0 or PCMCIA Standard Release 2.0 Max. 3 mm Memory cards Max. 4 MByte Max. 4 MByte
Standard Communication Interfaces	
Application Interface IF1 Electrical Isolation Design Max. Distance Max. Baud Rate	RS232 No 9 pin DSUB plug 15 m / 19200 Baud 115.2 kBaud
Application Interface IF2 Electrical Isolation Design Max. Distance Max. Baud Rate	CAN Yes 9 pin DSUB plug 1,000 m 500 kBaud
Digital Inputs	
Number of Inputs	10
Inputs with Additional Functions (TPU)	Inputs 1-4
Input Frequency (TPU)	50 kHz (Incremental encoder operation)
Wiring	Sink
Input Voltage Minimum Nominal Maximum	 18 VDC 24 VDC 30 VDC
Input Current at Nominal Voltage	Approx. 4 mA
Input Delay	Max. 1 ms (not TPU)

Table 4: Technical data for PP21 (cont.)

Product ID	PP21
Electrical Isolation	
Input - PLC	Yes
Input - Output	Yes
Digital Outputs	
Amount/Type	
Highside Driver IC (Transistor)	8
Potential-Free Relay Contact	1
Switching Voltage	
Minimum	18 VDC
Nominal	24 VDC
Maximum	30 VDC
Continuous Current per	
Output	Max. 0.4 A
Module	Max. 3.2 A
Load for Potential-Free Relay Contact	Max. 0.5 A
Leakage Current when Switched Off	12 µA
Overload Protection	Yes
Switching On after Overload Cutoff	Automatically within seconds (depends on the panel temperature)
Continuous Short Circuit Current	Typ. 4 A
Internal Protective Circuit	Yes
Braking Voltage when Switching Off Inductive Loads	47 V
Switching Delay	
Log. 0 - Log. 1	Max. 450 µs
Log. 1 - Log. 0	Max. 450 µs
Electrical Isolation	
Output - PLC	Yes
Output - Input	Yes
HMI	
Display	
Type	LC Display
Number of Lines	4
Number of Characters/Line	20
Character Height	4.75 mm
Background Lighting	LED
Character Set	English/Katakana
Reading Angle	Approx. 60 °
Keyboard	
Number of Keys	34 membrane keys
Design	Covered keypad with metallic snap-action disks
Function Keys	17, with LEDs, labeled with legend sheets
System Keys	17 (number block, control keys)
Front	Multi-layered front with insertion slots for key legends
Protection According to IEC 60529	IP65 (from front)
Power Supply	
Input Voltage	
Minimum	18 VDC
Nominal	24 VDC
Maximum	30 VDC

Table 4: Technical data for PP21 (cont.)

Product ID	PP21
Power Consumption	Max. 20 W
Output Power for Screw-in Modules and PCMCIA Interface	10 W
Operational Conditions	
Installation	Vertical, ±45°
Altitude	Max. 3,000 m
Environment Temperature during Operation	0 to 50 °C
Relative Humidity during Operation	10 to 90% (non-condensing)
Storage Conditions	
Storage Temperature	-20 to 60 °C
Relative Humidity for Storage	5 to 95 % (non-condensing)
Mechanical Characteristics	
Weight	Approx. 1.25 kg
Dimensions Width Height Depth	 155 mm 190 mm 84.4 mm

Table 4: Technical data for PP21 (cont.)

5.4 Images

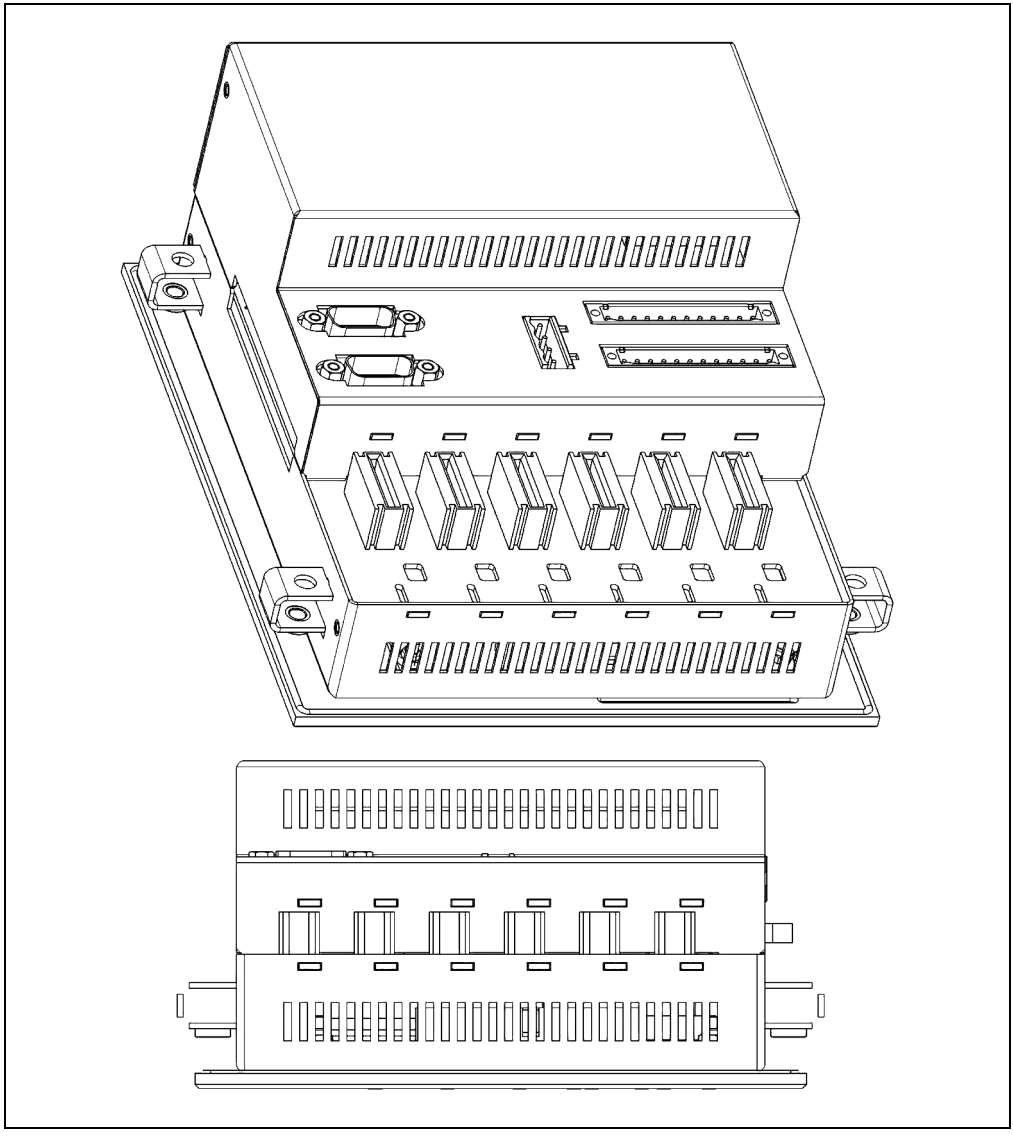


Figure 3: PP21

5.5 Dimensions

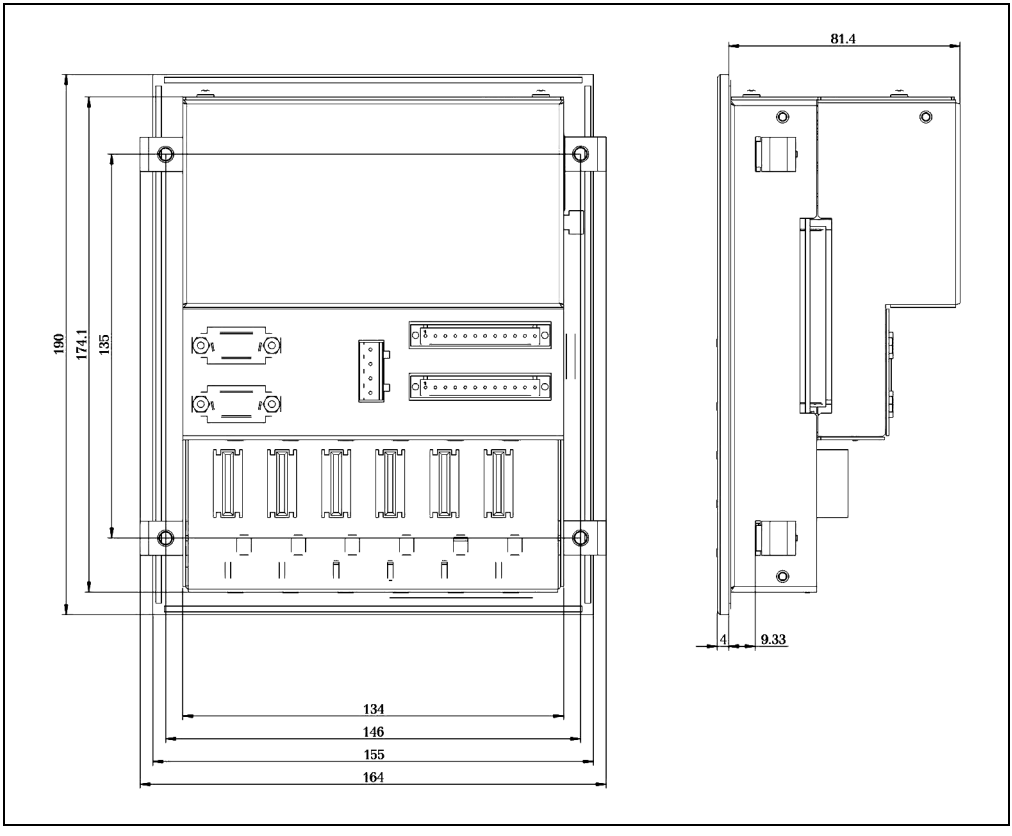


Figure 4: PP21 dimensions

6. Power Panel PP41

6.1 Order Data

Model Number	Short Description
	Power Panel
4P3040.00-490 [1)]	Power Panel PP41, 5.7 inch QVGA black/white LC display, 8 softkeys and 32 function keys, system compatible 2003 CPU, 700 KB SRAM, 1.4 MB FlashPROM, 1 PCMCIA slot, 1 RS232 interface, 1 CAN interface: electrically isolated, network capable, 6 slots for screw-in modules, 10 digital inputs 24 VDC, 8 digital outputs 24 VDC, 0.4 A, IP65 protection (from front), 205 x 220 mm (WxH), 24 VDC, Order TB712 terminal blocks separately!
	Accessories
0AC201.9	Lithium batteries, 5 pcs., 3 V / 950 mAh, button cell
0MC111.9	PCMCIA memory card, 2MB FlashPROM
0MC211.9	PCMCIA memory card, 2MB SRAM
4A0034.00-000	Set of legend strips for 4P3040.00-490 (für 10 Geräte)
4EX101.00	Power Panel expansion for PP41, 1 insert slot for interface module inserts
7TB712.9	Terminal block, 12 pin, screw clamps
7TB712.91	Terminal block, 12 pin, cage clamps
7TB712:90-02	Terminal block, 12 pin, 20 pcs., screw clamps
7TB712:91-02	Terminal block, 12 pin, 20 pcs., cage clamps

Table 5: Order data for PP41

1) All parts required to install the Power Panel, including key legend sheets, are included in its delivery. The backup battery and the 4 pin terminal block for the supply are also included. Two 12 pin terminal blocks must be ordered separately.

6.2 Photo

Figure 5: PP41

6.3 Technical Data

Product ID	PP41
General Information	
C-UL-US Listed	In preparation
Standards Temperature Shock / Tests Carried Out Vibration / Tests Carried Out Emission / Tests Carried Out Immunity / Tests Carried Out	 IEC61131-2 / IEC60068-2-x IEC61131-2 / IEC60068-2-27 IEC61131-2 / IEC60068-2-6 EN50081-2 / EN55022+A1 IEC61131-2 / IEC61000-4-x
Processor	
Additional I/O Processor	Handles I/O data points
Instruction Cycle Time (Average value with 70% bit and 30% analog processing)	0.4 µs
Standard Memory User RAM System PROM User PROM	 700 Kbyte SRAM 600 KByte FlashPROM 1.4 MByte FlashPROM

Table 6: Technical data for PP41

Product ID	PP41
Data Buffering Backup Battery Buffer Current Typical Maximum	 Lithium battery 3 V / 950 mAh 10 µA 200 µA
Hardware Watchdog	Yes
Voltage Monitoring	The internal supply is monitored for overvoltage and undervoltage
Fan	No
Peripherals	
Real-Time Clock Resolution	Nonvolatile 1 sec
Status Display	LEDs
System Bus for Expansions	Expansion module EX101 Insert slot for B&R SYSTEM 2005 interface module inserts
Slots for B&R 2003 Screw-in Modules Suitable for IF Modules (without CAN) TPU Functionality Support Suitable for CAN Communication	6 Slots 1-3 Slots 4-6 Slot 1 with interface module 4IF370.7
PCMCIA slot (See "PCMCIA Slot" on page 37.) Standard Card Height Card Type Memory Size SRAM FlashPROM	1 JEIDA V 4.0 or PCMCIA Standard Release 2.0 Max. 3 mm Memory cards Max. 4 MByte Max. 4 MByte
Standard Communication Interfaces	
Application Interface IF1 Electrical Isolation Design Max. Distance Max. Baud Rate	RS232 No 9 pin DSUB plug 15 m / 19200 Baud 115.2 kBaud
Application Interface IF2 Electrical Isolation Design Max. Distance Max. Baud Rate	CAN Yes 9 pin DSUB plug 1,000 m 500 kBaud
Digital Inputs	
Number of Inputs	10
Inputs with Additional Functions (TPU)	Inputs 1-4
Input Frequency (TPU)	50 kHz (Incremental encoder operation)
Wiring	Sink
Input Voltage Minimum Nominal Maximum	 18 VDC 24 VDC 30 VDC
Input Current at Nominal Voltage	Approx. 4 mA
Input Delay	Max. 1 ms (not TPU)

Table 6: Technical data for PP41 (cont.)

Product ID	PP41
Electrical Isolation Input - PLC Input - Output	 Yes Yes
Digital Outputs	
Amount/Type Highside Driver IC (Transistor) Potential-Free Relay Contact	 8 1
Switching Voltage Minimum Nominal Maximum	 18 VDC 24 VDC 30 VDC
Continuous Current per Output Module	 Max. 0.4 A Max. 3.2 A
Load for Potential-Free Relay Contact	Max. 0.5 A
Leakage Current when Switched Off	12 µA
Overload Protection	Yes
Switching On after Overload Cutoff	Automatically within seconds (depends on the panel temperature)
Continuous Short Circuit Current	Typ. 4 A
Internal Protective Circuit	Yes
Braking Voltage when Switching Off Inductive Loads	47 V
Switching Delay Log. 0 - Log. 1 Log. 1 - Log. 0	 Max. 450 µs Max. 450 µs
Electrical Isolation Output - PLC Output - Input	 Yes Yes
HMI	
Display Type	LCD B/W
Resolution	QVGA (320 x 240 pixels)
Display Diagonal	5.7" (145 mm)
Background Lighting Brightness Lifespan [1) 2)]	 150 cd/m² 20000 h
Reading Angle	Approx. 35°
Keyboard Number of Keys Design Function Keys System Keys	 40 membrane keys Covered keypad with metallic snap-action disks 16, with LEDs, labeled with legend sheets 24 (number block, cursor block, control keys)
Front	Multi-layered front with insertion slots for key legends
Protection According to IEC 60529	IP65 (from front)

Table 6: Technical data for PP41 (cont.)

Product ID	PP41
Power Supply	
Input Voltage Minimum Nominal Maximum	 18 VDC 24 VDC 30 VDC
Power Consumption	Max. 20 W
Output Power for Screw-in Modules and PCMCIA Interface	11 W
Operational Conditions	
Installation	Vertical, ±45°
Altitude	Max. 3,000 m
Environmental Temperature during Operation [3)]	0 to 50 °C
Relative Humidity during Operation	10 to 90% (non-condensing)
Storage Conditions	
Storage Temperature	-20 to 60 °C
Relative Humidity for Storage	5 to 95 % (non-condensing)
Mechanical Characteristics	
Weight	Approx. 1.95 kg
Dimensions Width Height Depth	 205 mm 220 mm 110.4 mm

Table 6: Technical data for PP41 (cont.)

1) 25 °C environmental temperature.
2) Brightness reduced to 50 %.
3) Depending on installation.

6.4 Images

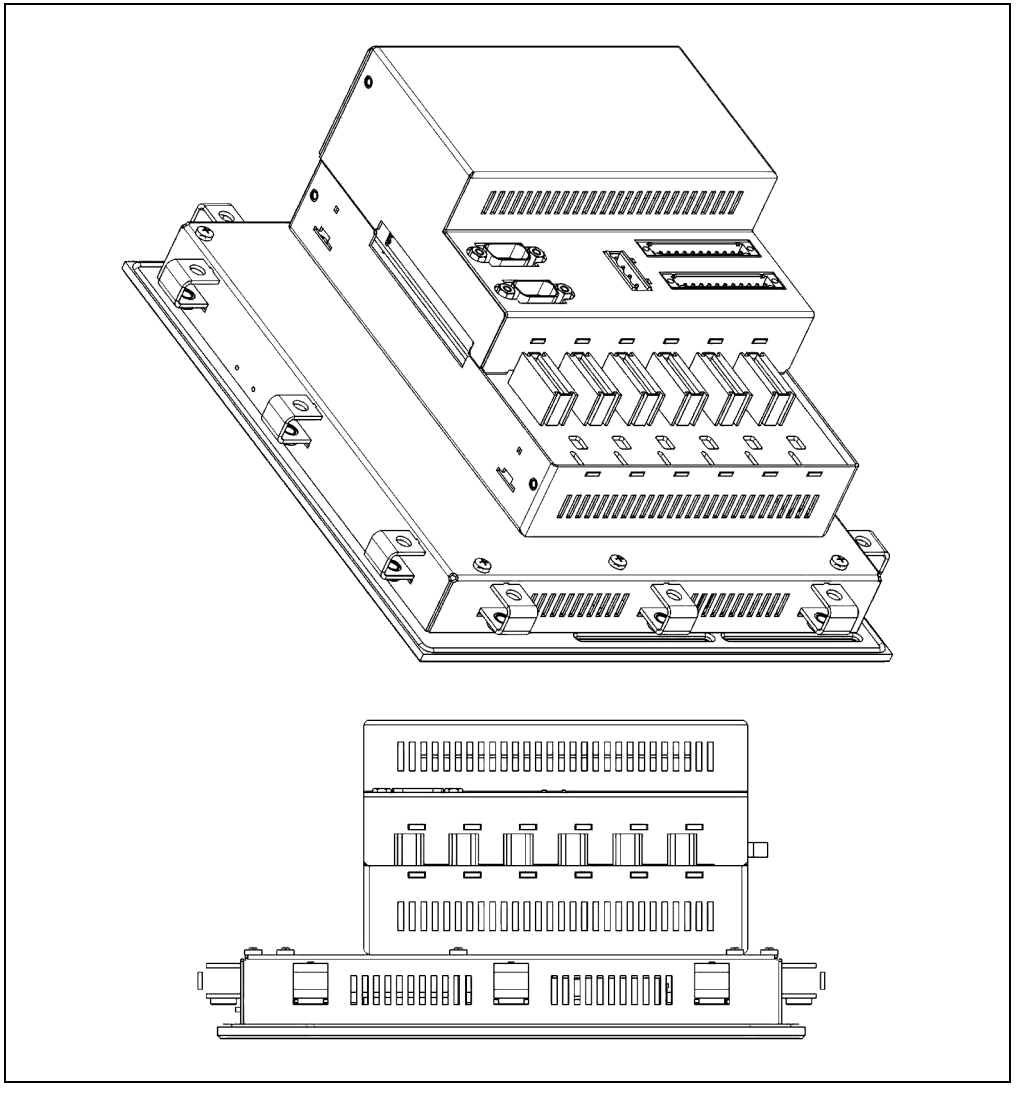


Figure 6: PP41

6.5 Dimensions

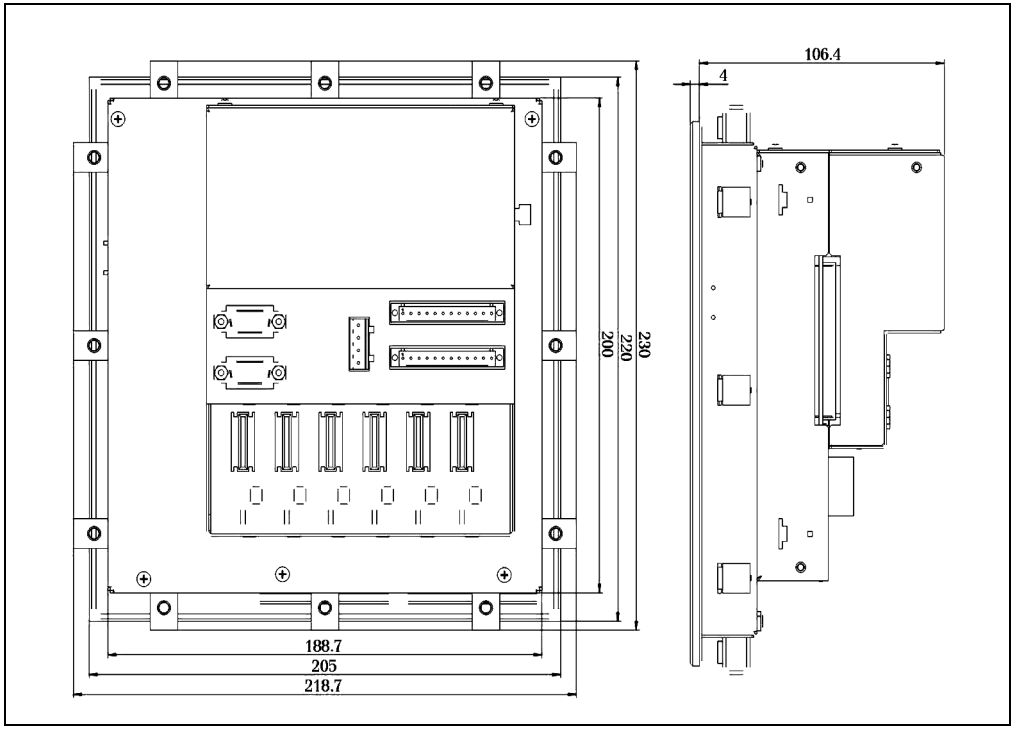


Figure 7: PP41 dimensions

7. Power Panel Expansion EX101 Module

7.1 General Information

The expansion module EX101 can be installed on the Power Panel PP41. B&R SYSTEMS 2005 interface module inserts can be operated in the EX101 insert slot.

A description for interface module inserts can be found in the "B&R SYSTEM 2005 User's Manual" (model no.: MASYS22005-E).

7.2 Order Data

Model Number	Short Description
4EX101.00	Power Panel expansion for PP41, 1 insert slot for interface module inserts

Table 7: Order data for EX101

The following B&R SYSTEM 2005 interface module inserts can be operated with the EX101 module:

Model Number	Short Description
3IF613.9	Three RS232 interfaces
3IF621.9	One RS485/RS422 interface and one CAN interface
3IF622.9	One RS232 interface and two RS485/RS422 interfaces
3IF661.9	One RS485 interface (PROFIBUS-DP Slave)
3IF671.9	One RS232 interface, one RS485/RS422 interface and one CAN interface
3IF672.9	One RS232 interface and two CAN interfaces
3IF681.95	One RS232 interface and one ETHERNET interface with 10 BASE2 connection (CHEAPERNET BNC socket)
3IF681.96	One RS232 interface and one ETHERNET interface with 10 BASE-T connection (Twisted Pair / RJ45 socket)

Table 8: Interface modules that can be operated in the EX101

7.3 Photo

The IF621 interface module insert shown in the picture is not included in the delivery

Figure 8: EX101

7.4 Technical Data

Product ID	EX101
General Information	
Module Type	Power Panel expansion for PP41
Peripherals	
Insert Slots	1 (for interface module inserts)
Mechanical Characteristics	
Dimensions Width Height Depth	 31 mm 173 mm 81.4 mm

Table 9: Technical data for EX101

7.5 Images

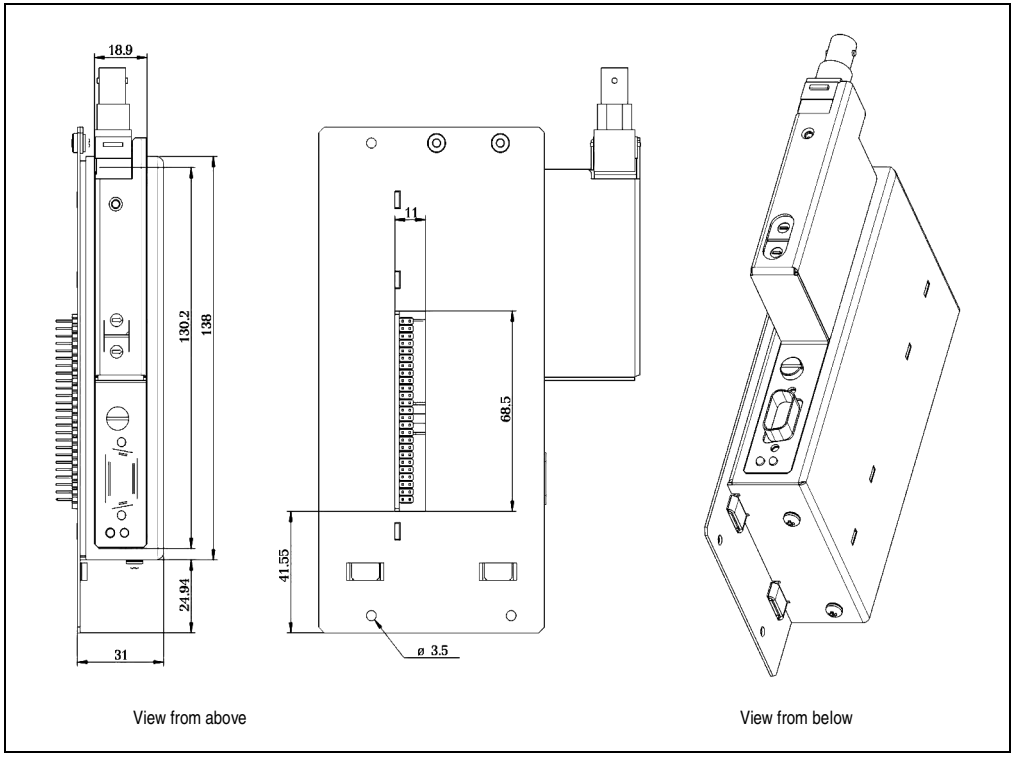


Figure 9: EX101

7.6 Dimensions

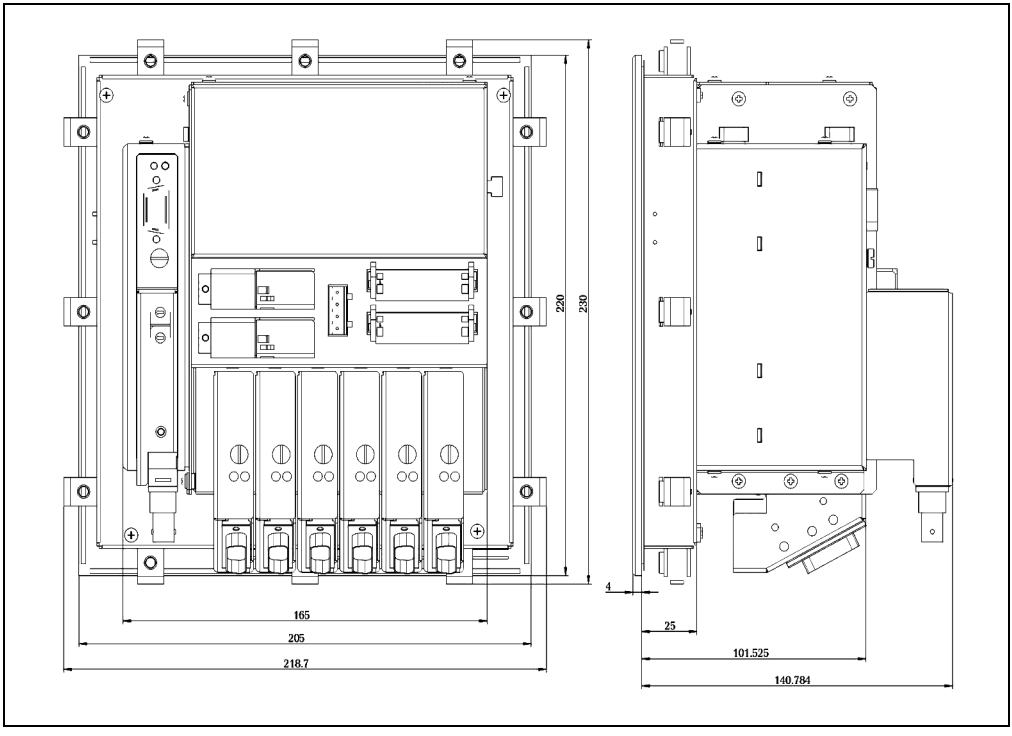


Figure 10: EX101 dimensions

7.7 Installation

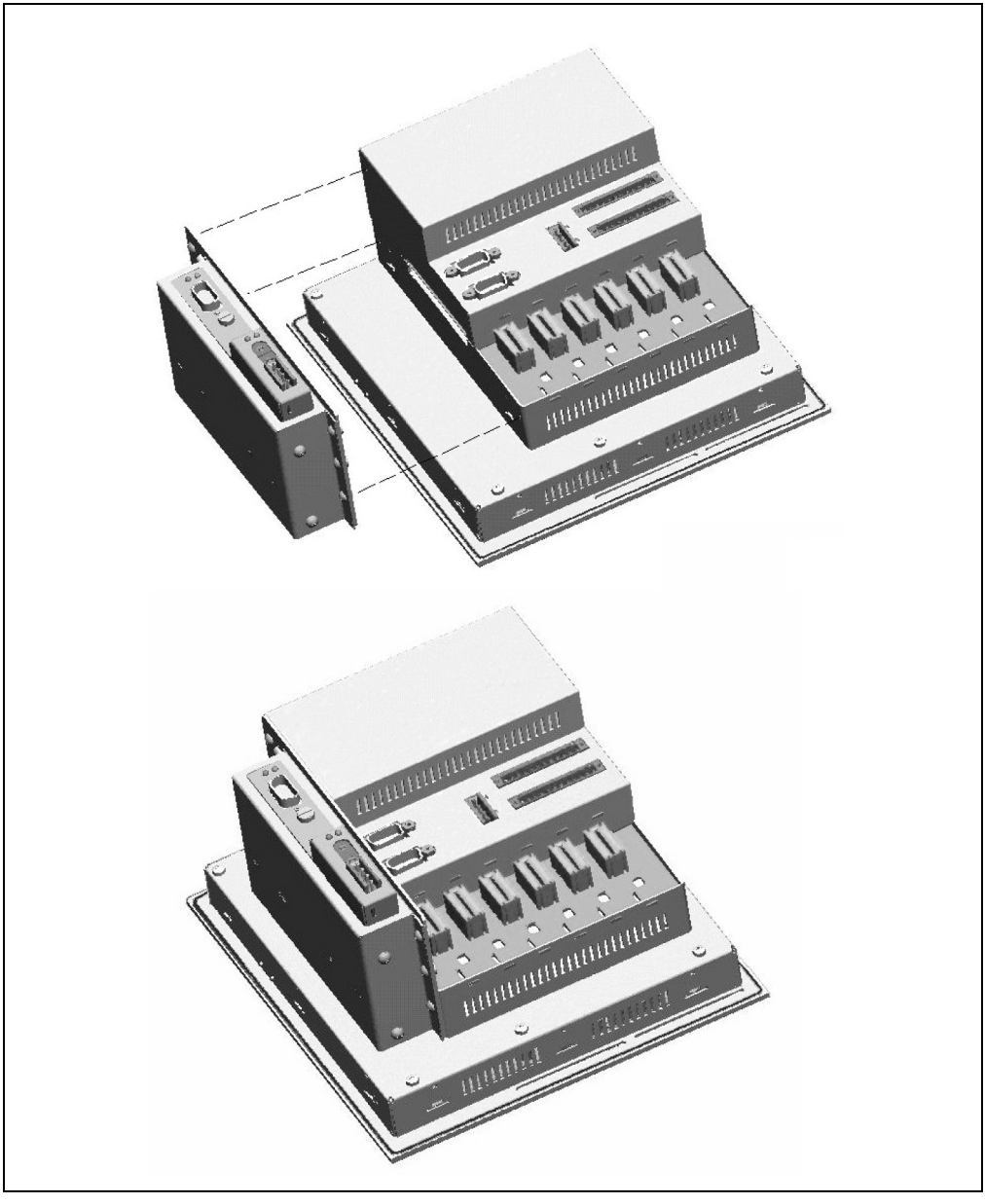


Figure 11: EX101 installation

8. IF370 CAN Interface Module

8.1 General Information

The IF370 interface module is used for connecting the B&R Power Panel to a CAN network. It must always be operated in slot 1.

The IF370 interface module is only suitable for operating with a B&R Power Panel. It should never be operated in a B&R SYSTEM 2003 module.

8.2 Order Data

Model Number	Short Description
4IF370.7	Power Panel interface module, 1 CAN interface, electrically isolated, network capable, screw-in module

Table 10: Order data for the IF370

8.3 Photo

Figure 12: IF370

8.4 Technical Data

Product ID	IF370
General Information	
C-UL-US Listed	In preparation

Table 11: Technical data for the IF370

Product ID	IF370
B&R ID Code	$44
Module Type	B&R Power Panel screw-in module
Slot	Power Panel interface, slot 1
Power Consumption	TBD
Standard Communication Interface	
Interface Type	CAN
Electrical Isolation	Interface - Power Panel
Design	9 pin DSUB plug
Status Display	2 Status LEDs
Maximum Distance	1,000 m
Maximum Baud Rate Bus Length 10 - 60 m Bus Length 100 -200 m Bus Length 800 -1,000 m	 Max. 500 kBit/s Max. 250 kBit/s Max. 50 kBit/s
Network Capable	Yes
Mechanical Characteristics	
Dimensions	B&R Power Panel screw-in module

Table 11: Technical data for the IF370

8.5 Status LEDs

Lit LEDs	Description
Yellow / Green	Data is being sent
Green	Data is being received

Table 12: IF370 status LEDs

8.6 Pin Assignments

Pin Assignment for CAN interface	
Pin	**Assignment**
1	NC
2	CAN_L
3	CAN_GND
4	NC
5	NC
6	Reserved
7	CAN_H
8	NC
9	NC

9 pin DSUB connector

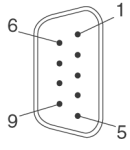


Table 13: Pin assignments for the IF370 CAN interface

9. Mounting Instructions

- The Power Panel should be mounted with the four retaining clips (two left and right which are supplied in the delivery.
- In order to guarantee proper air circulation, allow a distance of at least 10 cm (above and below) between the ventilation slots and all other objects.

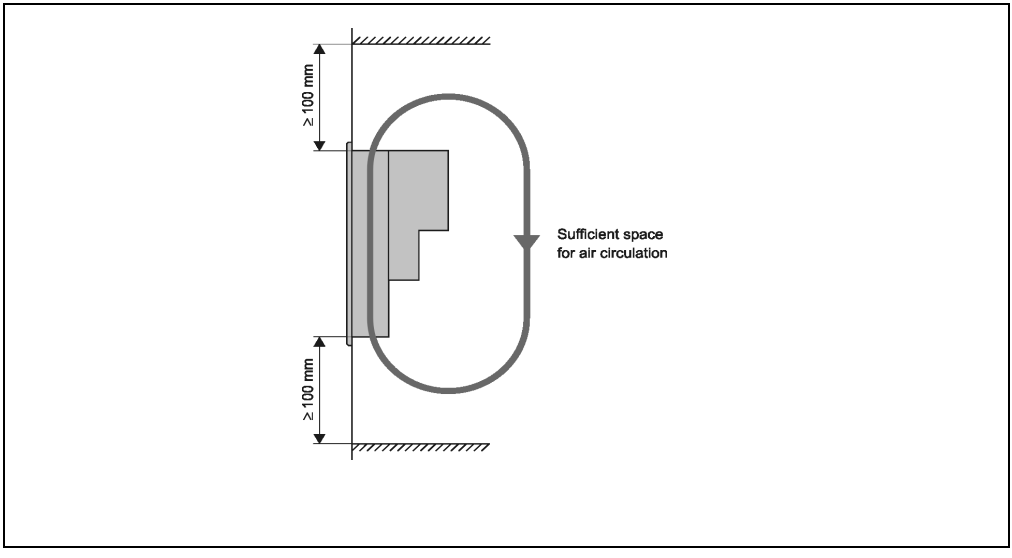


Figure 13: Sufficient space for air circulation

- The Power Panel can be mounted up to a maximum angle of 45°.

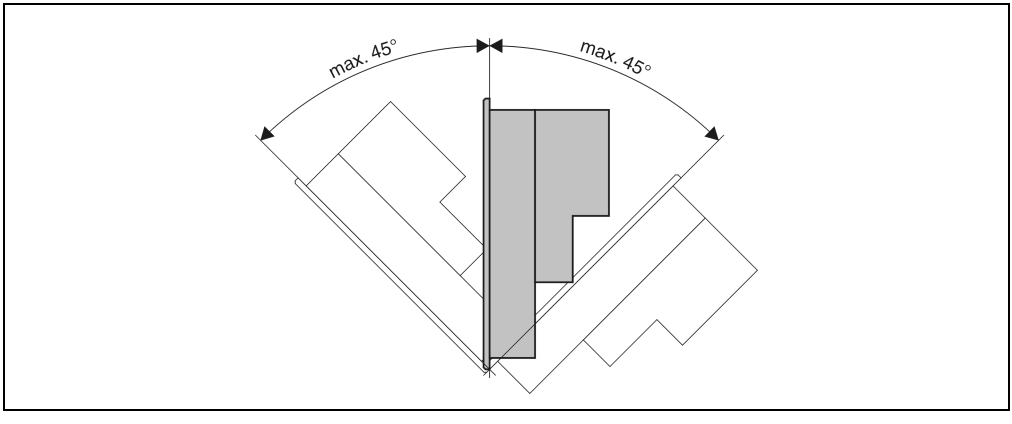


Figure 14: Mounting angle

10. Device Label

The assignment for the plugs and the pin connectors are indicated on the device label.

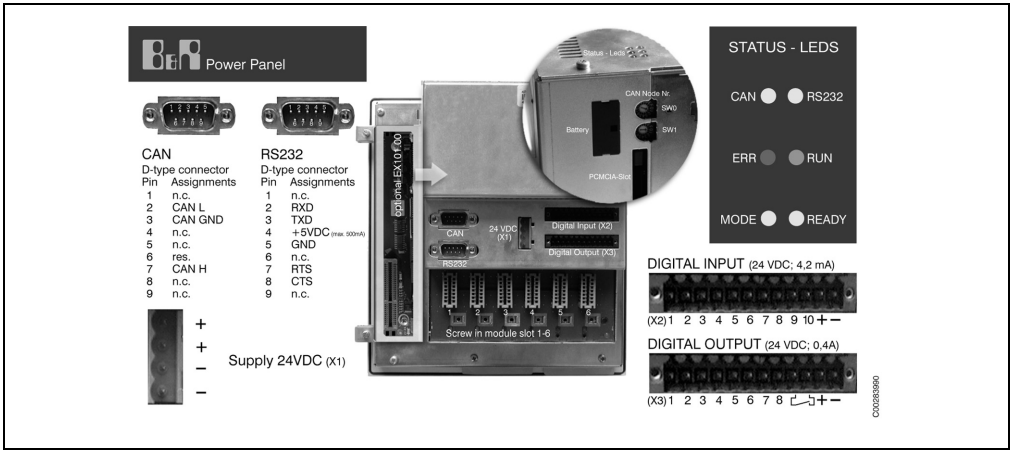


Figure 15: Device label

11. Programming

11.1 Programming the PLC CPU

Programming the PLC CPU is done using Automation Studio™ or PG2000. Several programming languages are available.

Automation Studio™	PG2000
Automation Basic (previously PL2000)	Instruction List (IL)
ANSI C	Ladder Diagram (LAD)
IEC 1131 Ladder Diagram (LAD)	PL2000 High Level Language (structured text)
IEC 1131 Sequential Function Chart (SFC)	
IEC 1131 Structured Text (ST)	
IEC 1131 Instruction List (IL)	

Table 14: Programming languages

11.2 Visualization

The visualization application is created using B&R Automation Studio™.

12. Description of Components

12.1 Status LEDs

LED	Color	Meaning
CAN	Yellow	Data transfer to or from CAN controller
RS232	Yellow	Indicates if data is being transmitted or received
ERR	Red	Lit in Service mode
RUN	Green	Lit in RUN and in Service mode
MODE	Yellow	Lit when programming FlashPROM
READY	Yellow	Lit in Service mode

Table 15: Status LEDs

12.2 Power Supply

The Power Panel is equipped with a 24 VDC power supply. The pin assignment is printed on the housing.

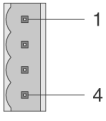
Power Supply for Pin Assignment		
Pin	Description	
1	+	
2	+	
3	-	
4	-	

Table 16: Power supply for pin assignment

Both "+" and "-" pins are connected to each other internally

12.3 Interfaces

The Power Panel has two interfaces:

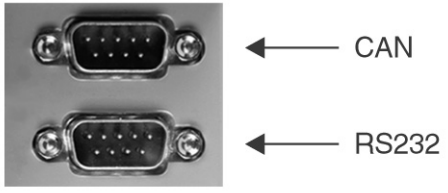


Figure 16: Interfaces

12.3.1 CAN Interface

The electrically isolated standard fieldbus interface is used for the following tasks:

- Communication with other control systems
- Decentralization and remote I/O expansion using B&R 2003 components and a CAN bus controller

We recommend using the AC911 T-connector for coupling to a CAN network. A terminal resistance is integrated into the T-connector for the bus termination, which can be switched on or off. For more information on wiring CAN fieldbus systems, see chapter 2, "Installation", section "CAN Fieldbus" in the B&R SYSTEM 2003 User's Manual.

Pin Assignment for CAN Interface	
Electrically isolated Assignment According to CiA DS 102-1	
Pin	**Assignment**
1	n. c.
2	CAN_L
3	CAN_GND
4	n. c.
5	n. c.
6	Reserved
7	CAN_H
8	n. c.
9	n. c.

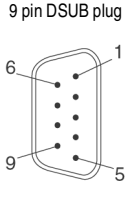


Table 17: Pin assignment for CAN interface

12.3.2 RS232 Interface

This non-electrically isolated interface is primarily intended for programming the CPU. The RS232 can also be used as a general interface (e.g. printer, bar code reader, etc.).

Pin Assignment for RS232 Interface	
RS232 Interface Not electrically isolated up to 115 kBaud	
Pin	**Assignment**
1	CTS
2	RXD
3	TXD
4	+5 VDC /max. 500 mA
5	GND
6	n. c.
7	RTS
8	CTS
9	GND

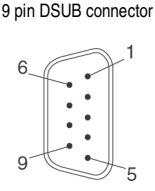


Table 18: Pin assignment RS232 interface

12.4 Operating Mode Switch

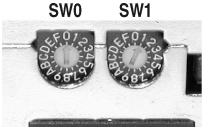


Figure 17: Operating mode switch

The Power Panels are equipped with 2 hex switches, which are used as an operating mode switch. Switch positions 01 - FC are available for any purpose in an application. The switch's position can be evaluated from an application program. The operating system only interprets the switch position when switched on.

All other switch positions are reserved for special functions.

Switch Position	Description
00	Programming System Flash (see respective section)
01 - FC	Freely available for use in an application (e.g. CAN node number)

Table 19: Switch settings for the MODE switch

Switch Position	Description
FD	This setting should not to be used. **Update Mode** - In this switch position, the Power Panel checks if an update memory card is inserted. If no card is inserted, the Power Panel goes into SERVICE mode. Otherwise (depending on the Update configuration) the operating system and/or the user-ROM for the Power Panel is cleared and reinstalled from the memory card. If an error occurs during the installation, the red ERROR LED blinks. When no errors have occurred during installation the green READY LED and the yellow RUN LED blink.
FE	Reserved for B&R expansions – these settings are not allowed to be used!
FF	Diagnosis Mode

Table 19: Switch settings for the MODE switch

12.5 Programming System Flash

The Power Panel is delivered without an operating system installed. An operating system can be downloaded or updated using the programming software. Installation of the operating system is possible with both programming systems. When carrying out operating system download for the first time using B&R Automation Studio™ , the steps below must be taken:

1) Switch off power supply to the PLC.
2) Set the MODE switch to 00.
3) Switch on the power supply again.
4) Make on-line connection to PC (physcially).
5) Start B&R Automation Studio™ ("OFFLINE" is displayed in the status bar)
6) Select menu item "PROJECT" - "SERVICES" - "TRANSFER OPERATING SYSTEM"
7) A window named "Operating System Transfer" opens
8) The COM port can be changed in this window, if required. Only in this case (using the "Try to connect Bootstraploader" button) must the connection be reestablished. If several PLC sofware versions are available, these can also be selected.
9) By clicking on "Next" in the new window CAN bus specific settings can be made.

12.6 PCMCIA Slot

The Power Panels are equipped with one PCMCIA interface for B&R memory cards. PCMCIA memory cards conforming to JEIDA V4.0 Type I or PCMCIA Standard Release 2.0 (max. 3 mm high) are supported.
The memory on the PCMCIA card can be used with all types of B&R modules. Executable programmes (Task) should not be stored on the PCMCIA card, because accessing the card takes considerably longer than accessing the Power Panel's onboard memory.

The Power Panel supports memory cards with up to 4 MByte SRAM or with up to 4 MByte FlashPROM. The following memory card can be ordered from B&R:

Model Number	Short Description	Power Consumption
0MC111.9	PCMCIA memory card, 2MB FlashPROM	Max. 0.8 W
0MC211.9	PCMCIA memory card, 2MB SRAM	Max. 0.8 W

The memory cards are used by the Power Panel as ROM Type "MEMCARD".

12.6.1 Limitations when using Memory Cards

Access of memory cards is very slow.

- Internal variables cannot be stored on the memory card
- Memory cannot be allocated on the memory cards

The SRAM and FlashPROM memory cards can only be written to by the Power Panel. Therefore it is not possible to program system software or the application on a memory card directly on a PC with a PCMCIA interface.

12.7 Power Panel Interface

The Power Panel is equipped with six slots for B&R SYSTEM 2003 screw-in modules. The required screw-in modules are inserted into the Power Panel interface and screwed firmly into place. The screw-in interface modules can be operated in slots 1 - 3. Screw-in modules can be used in slots 4 - 6, which possess TPU functionality. The first slot has a second CAN port and allows a second CAN interface by using a IF370 module.

12.8 Screw-in Module Overview

A description of the B&R SYSTEM 2003 screw-in module can be found in the "B&R SYSTEM 2003 User's Manual " (model. no.: MASYS22003-E).

Module	Type	Description
7AI261.7	Analog IN	1 input used to evaluate a full-bridge strain gauge
7AI351.70	Analog IN	1 x ±10 V or 1 x 0 - 20 mA (1 x ±20 mA also possible), potentiometer operation
7AI354.70	Analog IN	4 x ±10 V
7AI774.70	Analog IN	4 x 0 - 20 mA (4 x ±20 mA also possible)
7AO352.70	Analog OUT	2 x ±10 V / 0 - 20 mA
7AT324.70	Analog In	4 x temperature sensor (PT100, PT1000, KTY10 or KTY84)
7AT352.70	Analog IN	2 x PT100 3-line
7AT664.70	Analog IN	4 x thermocouple
7DI135.70	Digital IN	4 x 24 VDC, 50 kHz
7DI138.70	Digital IN	10 x 24 VDC, 2 x event counter operation

Table 20: Screw-in module overview

Module	Type	Description
7DI140.70	Digital IN	10 x 24 VDC, 2 x event counter / incremental encoder operation
7DO135.70	Digital OUT	4 x 12 - 24 VDC, 0.1 A, 100 kHz
7DO138.70	Digital OUT	8 x 24 VDC, 0.5 A, can be only be operated in slots 4 - 6
7IF311.7	Interface	1 x RS232
7IF321.7	Interface	1 x RS485/RS422
7IF361.70-1	Interface	1 x PROFIBUS DP Slave
4IF370.7	Interface	1 x CAN, can only be operated in slot 1
7NC161.7	Encoder module	1 x 100 kHz, 5 / 24 VDC

Table 20: Screw-in module overview

12.9 Data/Realtime Buffering

The battery voltage is checked cyclically. The load test of the battery does not considerably shorten the battery life, instead it gives an early warning of weakened buffer capacity. The status information, "Battery OK" is available from the B&R-TRAP function, "SYS_battery".

12.10 Digital Inputs

12.10.1 Terminal Block Connections

Inputs 1 - 4 are equipped with additional functions (event counter, ABR evaluation, etc.). The supply voltage for the digital inputs can be monitored with the application program.

Digital inputs pin assignments		
Connection	**Description**	
1	Input 1	
2	Input 2	
3	Input 3	
4	Input 4	
5	Input 5	
6	Input 6	
7	Input 7	
8	Input 8	
9	Input 9	
10	Input 10	
11	+24 VDC	
12	GND	

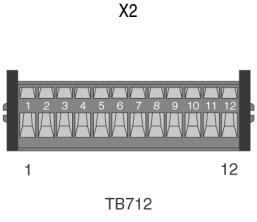


Table 21: Digital inputs pin assignments

12.10.2 Input Circuit Diagram

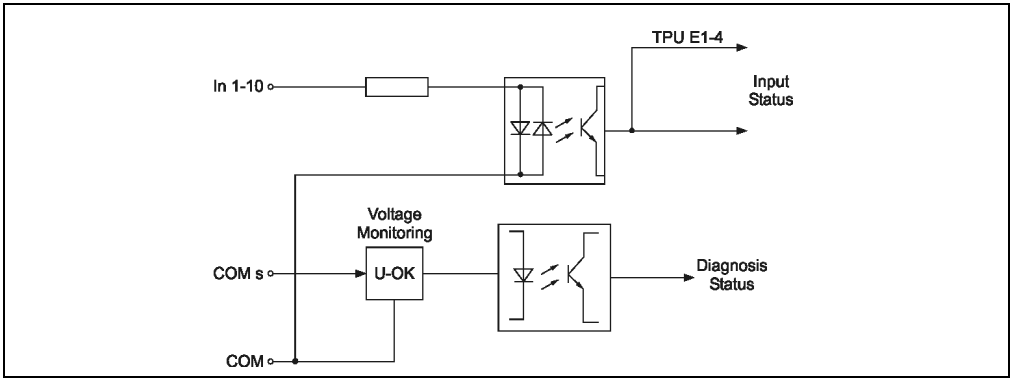


Figure 18: Digital inputs - input circuit diagram

12.10.3 Connection Example

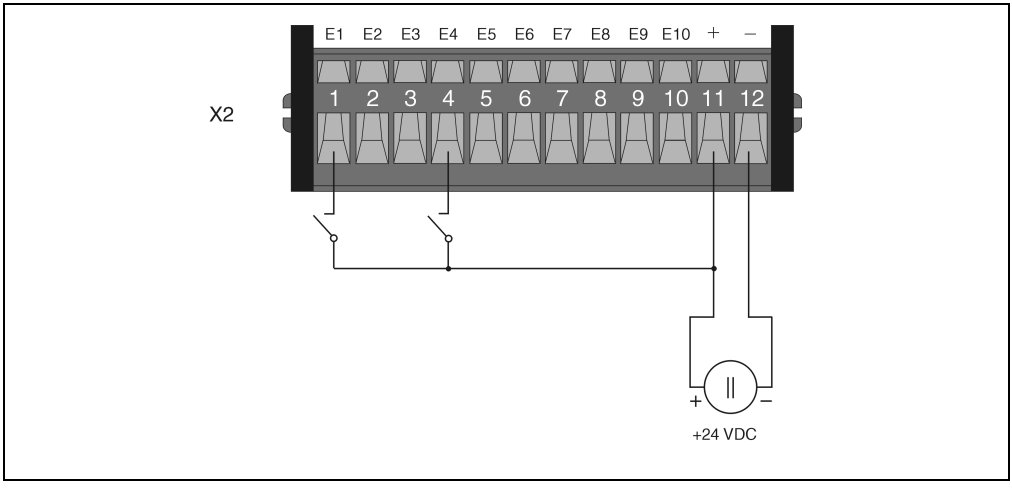


Figure 19: Digital inputs connection example

12.11 Digital Outputs

12.11.1 Terminal Block Connections

Digital Outputs Pin Assignment		
Connection	**Description**	
1	Output 1	
2	Output 2	
3	Output 3	
4	Output 4	
5	Output 5	
6	Output 6	
7	Output 7	
8	Output 8	
9	Potential-Free Relay Contact	
10	Potential-Free Relay Contact	
11	+24 VDC, outputs 1 - 8	
12	GND, outputs 1 - 8	

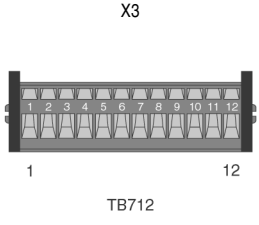


Table 22: Digital outputs pin assignment

12.11.2 Output Circuit Diagram

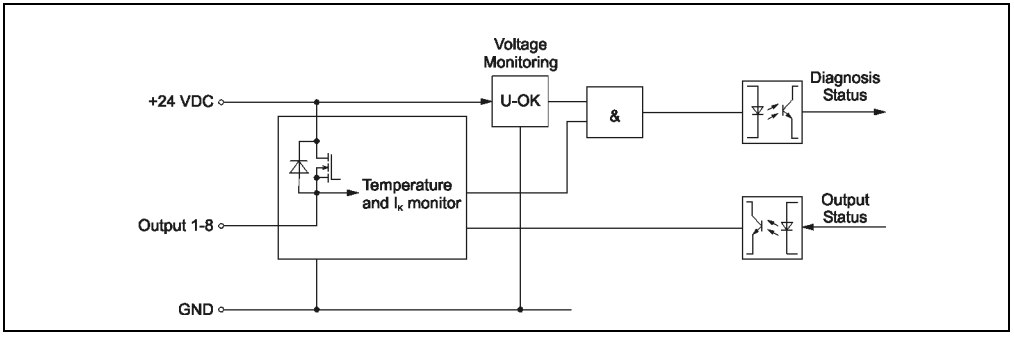


Figure 20: Digital outputs - output circuit diagram

12.11.3 Output Circuit Diagram for Potential-Free Relay Contact

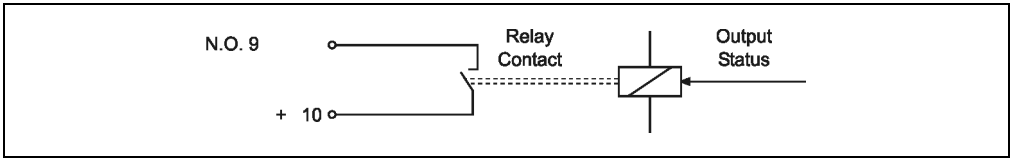


Figure 21: Connection example for relay contact

12.11.4 Connection Example for Outputs 1 - 8

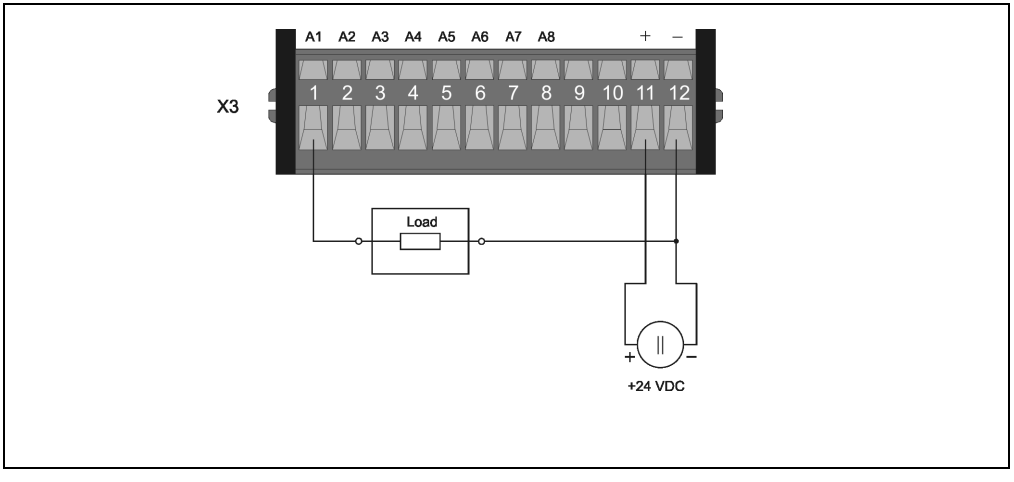


Figure 22: Connection example for outputs 1 - 8

12.11.5 Connection Example for Potential-Free Relay Contact

Example 1: E-STOP Circuit

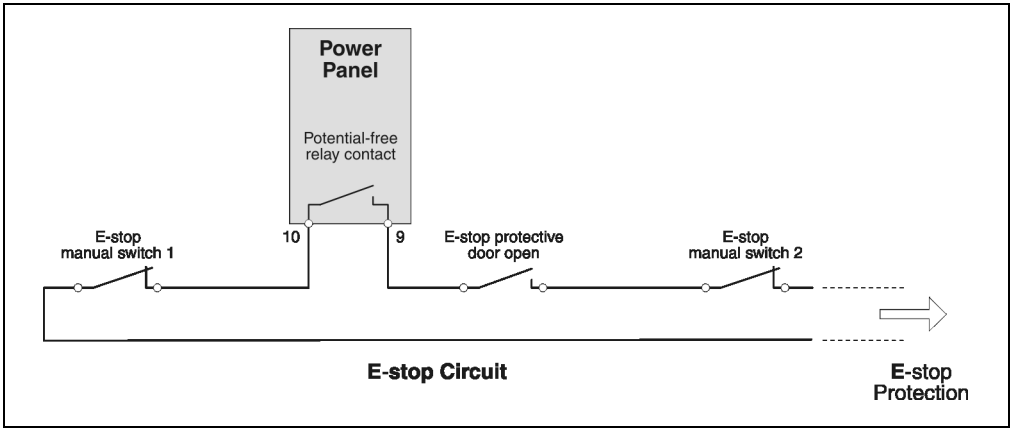


Figure 23: E-STOP circuit

Example 2: Switching a Load

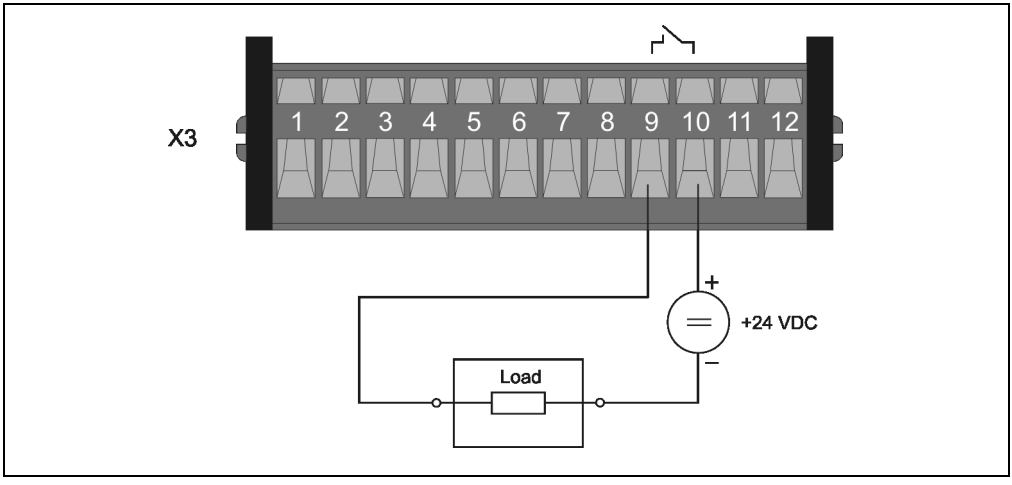


Figure 24: Switching a load

13. Changing the Battery

13.1 Battery Data

Lithium Battery	3 V / 950 mAh
Model Number	0AC201.9 (5 lithium batteries)
Storage Time	Max. 3 years at 30 °C
Relative Humidity	0 to 95 % (non-condensing)

Table 23: Battery data

13.2 Buffer Duration

Buffer Current	Panel CPU
Typical	10 µA
Maximum	200 µA

Table 24: Buffer duration

B&R recommend changing the batteries after five years of operation.

Procedure

The product design allows the battery to be changed with the Power Panel switched on or off. In some countries, safety regulations do not allow batteries to be changed while the module is switched on.

The data in RAM is buffered up to 10 min due to the gold foil capacitors. During this time period, a battery change without data loss is guaranteed.

- Touch the mounting rail or ground connection (not the power supply!) in order to discharge any electrostatic charge from your body.
- Remove the cover from the lithium battery holder using a screwdriver.
- Remove the battery from the holder by pulling the removal strip (don't use uninsulated tools >- risk of short circuiting). The battery should not be held by its edges. **Insulated** tweezers may also be used for removing the battery.

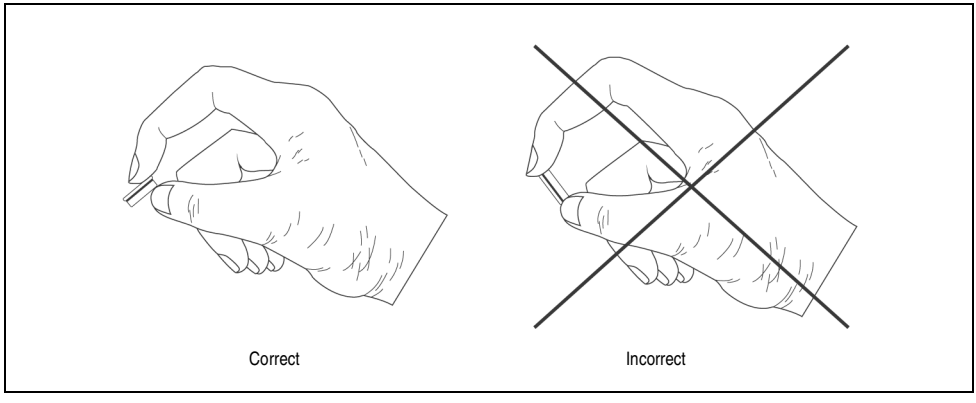


Figure 25: Handling the battery

- Insert the new battery with correct polarity. The removal strip should be protruding from the battery holder and the "+" side of the battery should be facing downward. In order to be able to remove the battery again in future, the removal strip **must** protrude from the upper side of the battery.
- Now wrap the end of the removal strip over the top of the battery and insert it underneath the battery so that it does not protrude from the battery holder.

Lithium batteries are considered hazardous waste! Used batteries should be disposed of accordingly.

Chapter 2 • Technical Appendix

1. Décor Foil (polyester foil)

The décor foil used by B&R conforms to DIN 42 115 (section 2). This means it is resistant to exposure to the following chemicals for a 24 hour period with no visible signs of damage:

<table>
<tr><td>Ethanol
Cyclohexanol
Diacetone alcohol
Glycol Isopropanol
Glycerin
Methanol
Triacetin
Dowandol DRM/PM</td><td colspan="2">Formaldehyde 37% - 42%
Acetaldehyde
Aliphatic hydrocarbons
Toluene
Xylene
White spirits</td><td>Trichloroethane
Ethyl acetate
Diethyl ether
N-Butyl acetate
Amyl acetate
Butylcellosolve
Ether</td></tr>
<tr><td>Acetone
Methyl ethyl ketone
Dioxan
Cyclohexanone
MIBK
Isophorone</td><td colspan="2">Formic acid <50%
Acetic acid <50%
Phosphoric acid <30%
Hydrochloric acid <36%
Nitric acid <10%
Trichloracetic acid <50%
Sulphuric acid <10%</td><td rowspan="2">Sodium hypochlorite <20%
Hydrogen peroxide <25%
Potassium carbonate
Washing powders
Fabric conditioner
Ferric chloride
Ferrous chloride (FeCl2)
Ferrous chloride (FeCl3)
Dibutyl Phthalate
Dioctyl Phthalate
Sodium carbonate</td></tr>
<tr><td>Ammonia <40%
Caustic soda <40%
Potassium hydroxide
Alkali carbonate
Bichromate
Potassium
Ferro cyanide/ Ferro cyanide
Acetonitrile
Sodium bisulphate</td><td>Cutting oil
Diesel oil
Linseed oil
Paraffin oil
Blown castor oil
Silicon oil
Turpentine oil substitute
Universal brake fluid
Decon</td><td>Aviation fuel
Petrol
Water
Sea water</td></tr>
</table>

Table 25: Resistance to chemicals

The décor foil conforms to DIN 42 115 section 2 for exposure to glacial acetic acid < 1 hour without any sign of visible damage.

2. Characters for LC Displays (English/Katakana)

Dec.	Hex.	Character	Controller Character		Dec.	Hex.	Character	Controller Character
000	$00				032	$20		SPC
001	$01				033	$21	!	
002	$02				034	$22	"	
003	$03				035	$23	#	
004	$04				036	$24	$	
005	$05				037	$25	%	
006	$06				038	$26	&	
007	$07				039	$27	’	
008	$08		BS		040	$28	(	
009	$09				041	$29	)	
010	$0A		LF		042	$2A	*	
011	$0B				043	$2B	+	
012	$0C				044	$2C	,	
013	$0D				045	$2D	-	
014	$0E				046	$2E	.	
015	$0F				047	$2F	/	
016	$10				048	$30	0	
017	$11		XON		049	$31	1	
018	$12		DC2		050	$32	2	
019	$13		XOFF		051	$33	3	
020	$14		DC4		052	$34	4	
021	$15				053	$35	5	
022	$16		SYN		054	$36	6	
023	$17				055	$37	7	
024	$18				056	$38	8	
025	$19				057	$39	9	
026	$1A				058	$3A	:	
027	$1B		ESC		059	$3B	;	
028	$1C				060	$3C	<	
029	$1D				061	$3D	=	
030	$1E				062	$3E	>	
031	$1F				063	$3F	?	

Dec.	Hex.	Character	Controller Character		Dec.	Hex.	Character	Controller Character
064	$40	@			096	$60	‘	
065	$41	A			097	$61	a	
066	$42	B			098	$62	b	
067	$43	C			099	$63	c	
068	$44	D			100	$64	d	
069	$45	E			101	$65	e	
070	$46	F			102	$66	f	
071	$47	G			103	$67	g	
072	$48	H			104	$68	h	
073	$49	I			105	$69	i	
074	$4A	J			106	$6A	j	
075	$4B	K			107	$6B	k	
076	$4C	L			108	$6C	l	
077	$4D	M			109	$6D	m	
078	$4E	N			110	$6E	n	
079	$4F	O			111	$6F	o	
080	$50	P			112	$70	p	
081	$51	Q			113	$71	q	
082	$52	R			114	$72	r	
083	$53	S			115	$73	s	
084	$54	T			116	$74	t	
085	$55	U			117	$75	u	
086	$56	V			118	$76	v	
087	$57	W			119	$77	w	
088	$58	X			120	$78	x	
089	$59	Y			121	$79	y	
090	$5A	Z			122	$7A	z	
091	$5B	[			123	$7B	{	
092	$5C	¥			124	$7C	|	
093	$5D	]			125	$7D	}	
094	$5E	^			126	$7E	?	
095	$5F	_			127	$7F	?	

Dec.	Hex.	Character	Controller Character		Dec.	Hex.	Character	Controller Character
128	$80		Free		160	$A0		Free
129	$81	e			161	$A1	｡	
130	$82		Free		162	$A2	｢	
131	$83		Free		163	$A3	｣	
132	$84	u			164	$A4	､	
133	$85		Free		165	$A5	･	
134	$86		Free		166	$A6	ｦ	
135	$87		Free		167	$A7	ｧ	
136	$88		Free		168	$A8	ｨ	
137	$89		Free		169	$A9	ｩ	
138	$8A		Free		170	$AA	ｪ	
139	$8B		Free		171	$AB	ｫ	
140	$8C		Free		172	$AC	ｬ	
141	$8D		Free		173	$AD	ｭ	
142	$8E	Ä			174	$AE	ｮ	
143	$8F		Free		175	$AF	ｯ	
144	$90		Free		176	$B0	ｰ	
145	$91		Free		177	$B1	ｱ	
146	$92		Free		178	$B2	ｲ	
147	$93		Free		179	$B3	ｳ	
148	$94	ö			180	$B4	ｴ	
149	$95		Free		181	$B5	ｵ	
150	$96		Free		182	$B6	ｶ	
151	$97		Free		183	$B7	ｷ	
152	$98		Free		184	$B8	ｸ	
153	$99	Ö			185	$B9	ｹ	
154	$9A	Ü			186	$BA	ｺ	
155	$9B		Free		187	$BB	ｻ	
156	$9C		Free		188	$BC	ｼ	
157	$9D		Free		189	$BD	ｽ	
158	$9E		Free		190	$BE	ｾ	
159	$9F		Free		191	$BF	ｿ	

Dec.	Hex.	Character	Controller Character		Dec.	Hex.	Character	Controller Character
192	$C0	ﾀ			224	$E0		Free
193	$C1	ﾁ			225	$E1	ß	
194	$C2	ﾂ			226	$E2		Free
195	$C3	ﾃ			227	$E3		Free
196	$C4	ﾄ			228	$E4		Free
197	$C5	ﾅ			229	$E5		Free
198	$C6	ﾆ			230	$E6		Free
199	$C7	ﾇ			231	$E7		Free
200	$C8	ﾈ			232	$E8		Free
201	$C9	ﾉ			233	$E9		Free
202	$CA	ﾊ			234	$EA		Free
203	$CB	ﾋ			235	$EB		Free
204	$CC	ﾌ			236	$EC		Free
205	$CD	ﾍ			237	$ED		Free
206	$CE	ﾎ			238	$EE		Free
207	$CF	ﾏ			239	$EF		Free
208	$D0	ﾐ			240	$F0		Free
209	$D1	ﾑ			241	$F1		Free
210	$D2	ﾒ			242	$F2		Free
211	$D3	ﾓ			243	$F3		Free
212	$D4	ﾔ			244	$F4		Free
213	$D5	ﾕ			245	$F5		Free
214	$D6	ﾖ			246	$F6		Free
215	$D7	ﾗ			247	$F7		Free
216	$D8	ﾘ			248	$F8		Free
217	$D9	ﾙ			249	$F9		Free
218	$DA	ﾚ			250	$FA		Free
219	$DB	ﾛ			251	$FB		Free
220	$DC	ﾜ			252	$FC		Free
221	$DD	ﾝ			253	$FD		Free
222	$DE	ﾞ			254	$FE		Free
223	$DF	ﾟ			255	$FF		Free

B

Battery 44
buffer duration 44

C

CAN Interface 35
Character Set 48

D

Décor 47
Décor foil 47
Device Label 33
Digital Inputs 40
Digital Outputs 41

E

EX101
  Dimensions 28
  General Information 25
  Images 27
  Installation 29
  Order Data 25
  Photo 26
  Technical Data 27

I

IF370 30
  General Information 30
  Order Data 30
  Photo 30
  Pin Assignments 31
  Status LEDs 31
  Technical Data 30
IF370 CAN Interface Module 30
Interfaces 35

K

Katakana 48

M

Manual History 9
Mounting Instructions 32

O

Operating Mode Switch 36

P

PCMCIA Interface 37
Power Panel Expansion 25
Power Panel Interface 38
Power Panel PP21 12
  Dimensions 18
  Images 17
  Order Data 12
  Photo 13
  Technical Data 13
Power Panel PP41 19
  Dimensions 25
  Images 24
  Order Data 19
  Photo 20
  Technical Data 20
Power Supply 34
Programming 33
Programming System Flash 37
Programming the PLC CPU 33

R

Realtime Buffering 39
RS232 Interface 36

S

Safety Guidelines 7
  Design 9
  Installation 8
  Intended Use 7
  Introduction 7
  Operation 8
Screw-in Modules 38
Status LEDs 34

T

Technical Appendix 47
Terminal Block 40

V

Visualization 33